

Notice of Allowability

Application No.

10/666,773

Examiner

Tammara R. Peyton

Applicant(s)

NIVER ET AL.

Art Unit

2182

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 8/13/07.
2. ☒ The allowed claim(s) is/are 1-43.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____
7. ☒ Examiner's Amendment/Comment
8. ☐ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____

TAMMARA PEYTON
PRIMARY EXAMINER

Art Unit: 2182

EXAMINER'S AMENDMENT AND REASON FOR ALLOWANCE

I. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

The application has been amended as follows:

Pursuant to MPEP 606.01, the title has been changed to read:

--MESSAGE BASED GLOBAL DISTRIBUTED LOCKS WITH AUTOMATIC EXPIRATION FOR INDICATING THAT SAID LOCKS IS EXPIRED--

II. Authorization for this Examiner's Amendment to the claims was given in a telephonic interview with Applicant's Attorney Anne Saturnelli, Reg. No. 41,290 on 10/25/07. The Examiner proposed amendments will better place the application in condition for allowance, particularly adding the limitation to overcoming 35 U.S.C. 101 issues.

The application has been amended as follows:

Claim 1. (Currently Amended) A method executed in a computer system for distributed lock management comprising:

determining, by a requesting node requesting a lock, a current lock owner of the lock in accordance with an indicator specifying which one or more nodes are available as lock owners; and

Art Unit: 2182

sending a lock request message to said current lock owner; and
wherein

said requesting node waits for an indication as to whether the lock request message has been granted or denied, and said determining is performed by said requesting node prior to said sending for each request, and wherein, each time said lock is granted, an expiration time is determined indicating that said lock expires automatically when said expiration time is reached.

Claim 18. (Currently Amended) A method executed in a computer system for distributed lock management in a data storage system comprising:

determining, by a requesting node requesting a lock, a current lock owner of the lock in accordance with an indicator specifying which one or more nodes are available as lock owners; and

sending a lock request message to said current lock owner, and wherein said determining is performed by said requesting node prior to said sending for each request and wherein, each time said lock is granted, an automatic expiration period is determined indicating when a current grant of said lock at said each time automatically expires.

Claim 23. (Currently Amended) A computer readable medium [[program product]] for distributed lock management including executable code stored thereon, the computer readable medium comprising:

Art Unit: 2182

executable code that determines, by a requesting node requesting a lock, a current lock owner of the lock in accordance with an indicator specifying which one or more nodes are available as lock owners; and

executable code that sends a lock request message to said current lock owner; and

wherein

said requesting node waits for an indication as to whether the lock request message has been granted or denied, and said executable code that determines is executed by said requesting node prior to executing said executable code that sends for each request, and wherein, each time said lock is granted, an expiration time is determined indicating that said lock expires automatically when said expiration time is reached.

Claim 24. (Currently Amended) The computer readable medium [[program product]] of Claim 23, wherein said lock request message includes a time period indicated an amount of time for which said requesting node is requesting said lock.

Claim 25. (Currently Amended) The computer readable medium [[program product]] of Claim 24, further comprising executable code that performs, by said current lock owner:

receiving said lock request message;

determining whether said lock is currently granted to another node; and

Art Unit: 2182

granting said lock to said requesting node if said lock is not currently granted to another node, and denying said lock to said requesting node otherwise.

Claim 26. (Currently Amended) The computer readable medium [[program product]] of Claim 25, further comprising executable code that performs, by said current lock owner:

adding said time period to a current time producing said expiration time, said expiration time being used in connection with a subsequent determination as to whether the lock is currently granted to a node.

Claim 27. (Currently Amended) The computer readable medium [[program product]] of Claim 26, further comprising executable code that performs by said current lock owner:

comparing said current time to said expiration time to determine whether said lock is currently granted.

Claim 28. (Currently Amended) The computer readable medium [[program product]] of Claim 27, further comprising:

executable code that sends, by said current lock owner to said requesting node, a lock response message indicating whether said lock request message has been granted or denied.

Art Unit: 2182

Claim 29. (Currently Amended) The computer readable medium [[program product]] of Claim 28, further comprising:

executable code that determines by said requesting node, that said lock request message has been denied if one of: no lock response message is received from said lock owner in accordance with a timeout condition, and a lock response message is received indicating that said lock request message has been denied.

Claim 30. (Currently Amended) The computer readable medium [[program product]] of Claim 29, wherein said requesting node is granted said lock until said expiration time is reached, said requesting node becomes unavailable, and said lock expires automatically when said expiration time is reached.

Claim 31. (Currently Amended) The computer readable medium [[program product]] of Claim 29, wherein said current lock owner becomes unavailable as a lock owner, and the computer program product further comprises executable code that performs, by a second node:

determining a new current lock owner of the lock in accordance with an indicator specifying which one or more nodes are available as lock owners, said indicator indicating that said current lock owner is not available; and

sending a lock request message to said new current lock owner, wherein said determining provides for dynamic reassignment of a new lock owner of said lock.

Art Unit: 2182

Claim 32. (Currently Amended) The computer readable medium [[program product]] of Claim 31, wherein said distributed lock management is for a distributed lock management in a data storage system including a plurality of nodes, each of said plurality of nodes being a director in said data storage system.

Claim 33. (Currently Amended) The computer readable medium [[program product]] of Claim 32, wherein said lock is associated with a resource used by two or more nodes in said data storage system.

Claim 34. (Currently Amended) The computer readable medium [[program product]] of Claim 33, wherein said resource is a portion of global memory.

Claim 35. (Currently Amended) The computer readable medium [[program product]] of Claim 33, wherein each of said lock request message and said lock response message are sent using a message switch included in said data storage system.

Claim 36. (Currently Amended) The computer readable medium [[program product]] of Claim 35, wherein said lock request message and said lock response message are transmitted between nodes in said data storage system using portions of a message switch used in transmitting data messages.

Art Unit: 2182

Claim 37. (Currently Amended) The computer readable medium [[program product]] of Claim 32, wherein each of said plurality of nodes indicated as being available as a lock owner in accordance with said indicator is designated as a lock owner of a lock.

Claim 38. (Currently Amended) The computer readable medium [[program product]] of Claim 37, wherein any one of said plurality of nodes may request any lock, and wherein any one of said plurality of nodes may be designated as a lock owner of any lock in accordance with said indicator.

Claim 39. (Currently Amended) The computer readable medium [[program product]] of Claim 23, wherein said distributed lock management is used in a data storage system including a plurality of nodes, said plurality of nodes being directors that are endpoint in said data storage system, and said executable code that determines and said executable code that sends are included in each of said plurality of nodes and executed prior to sending a lock request message.

Claim 40. (Currently Amended) A computer readable medium [[program product]] for distributed lock management in a data storage system including executable code stored thereon, the computer readable medium comprising:

Art Unit: 2182

executable code that determines, by a requesting node requesting a lock, a current lock owner of the lock in accordance with an indicator specifying which one or more nodes are available as lock owners; and

executable code that sends a lock request message to said current lock owner, and wherein said executable code that determines is executed by said requesting node prior to executing said executable code that sends for each request and wherein, each time said lock is granted, an automatic expiration period is determined indicating when a current grant of said lock at said each time automatically expires.

Claim 41. (Currently Amended) The computer readable medium [[program product]] of Claim 40, wherein said data storage system includes a plurality of nodes which are processors, each of said plurality of nodes being an endpoint and being a lock owner as designated by said indicator when said each node is available as a lock holder.

Claim 42. (Currently Amended) The computer readable medium [[program product]] of Claim 40, wherein said lock request message includes a time period for which said requesting node is requesting said lock, and wherein said current lock owner determines said automatic expiration period for said lock using said time period.

Art Unit: 2182

Claim 43. (Currently Amended) The computer readable medium [[program product]] of Claim 42, wherein said current lock owner includes executable code that determines whether to grant or deny said lock request message in accordance with a current value for said automatic expiration period determined in accordance with a prior lock request message.

III. RELEVANT ART CITED BY THE EXAMINER

The following prior art made of record and not relied upon is cited to establish the level of skill in the applicant's art and those arts considered reasonably pertinent to applicant's disclosure. See MPEP 707.05(c).

The following reference teaches managing checkpoint queues in a multiple node system by determining when a master may grant or deny "ownership permission" for a particular node.

U.S. PATENT NUMBER

US 6,353,836 – Bamford et al.

III. ALLOWABLE SUBJECT MATTER

The following is an examiner's statement of reasons for allowance based on the newly cited prior art above and previously cited prior art; therein, claims 1, 18, 22, 23, and 40 include allowable subject matter and considered pertinent to the

Art Unit: 2182

applicant's disclosure, taken individually or in combination, the prior art of record and the newly filed prior art above does not teach or suggest the claimed limitations having " a method for distributed lock management comprising: determining, by a requesting node requesting a lock, a current lock owner of the lock in accordance with an indicator specifying which one or more nodes are available as lock owners; and sending a lock request message to said current lock owner; and wherein ... said determining is performed by said requesting node prior to said sending for each request, and wherein, each time said lock is granted, an expiration time is determined indicating that said lock expires automatically when said expiration time is reached. The remaining claims 2-17, 19-21, 24-39, and 41-43 are allowed by virtue of their dependencies on the independent claims.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance.

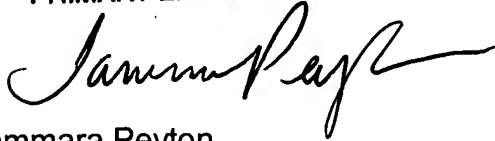
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tammara Peyton whose telephone number is (571) 272-4157. The examiner can normally be reached between 6:30 - 4:00

Art Unit: 2182

from Monday to Thursday, (I am off every first Friday), and 6:30-3:00 every second Friday. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kim Huynh can be reached on (571) 272-4083. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300. Any inquiry of a general nature of relating to the status of this application should be directed to the Group receptionist whose telephone number is (571) 272-2100.

TAMMARA PEYTON
PRIMARY EXAMINER

A handwritten signature in cursive script, appearing to read 'Tammara Peyton', written in black ink.

Tammara Peyton

October 26, 2007

Art Unit: 2182

EXAMINER'S AMENDMENT AND REASON FOR ALLOWANCE

I. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

The application has been amended as follows:

Pursuant to MPEP 606.01, the title has been changed to read:

--MESSAGE BASED GLOBAL DISTRIBUTED LOCKS WITH AUTOMATIC
EXPIRATION FOR INDICATING THAT SAID LOCKS IS EXPIRED--

II. RELEVANT ART CITED BY THE EXAMINER

The following prior art made of record and not relied upon is cited to establish the level of skill in the applicant's art and those arts considered reasonably pertinent to applicant's disclosure. See MPEP 707.05(c).

The following reference teaches managing checkpoint queues in a multiple node system by determining when a master may grant or deny "ownership permission" for a particular node.

U.S. PATENT NUMBER

Art Unit: 2182

US 6,353,836 – Chandrasekaran et al.

III. ALLOWABLE SUBJECT MATTER

The following is an examiner's statement of reasons for allowance based on the newly cited prior art above and previously cited prior art; therein, claims 1, 18, 22, 23, and 40 include allowable subject matter and considered pertinent to the applicant's disclosure, taken individually or in combination, the prior art of record and the newly cited prior art above does not teach or suggest the claimed limitations having " a method for distributed lock management comprising: determining, by a requesting node requesting a lock, a current lock owner of the lock in accordance with an indicator specifying which one or more nodes are available as lock owners; and sending a lock request message to said current lock owner; and wherein ... said determining is performed by said requesting node prior to said sending for each request, and wherein, each time said lock is granted, an expiration time is determined indicating that said lock expires automatically when said expiration time is reached. The remaining claims 2-17, 19-21, 24-39, and 41-43 are allowed by virtue of their dependencies on the independent claims.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should

Art Unit: 2182

US 6,353,836 – Bamford et al.

III. ALLOWABLE SUBJECT MATTER

The following is an examiner's statement of reasons for allowance based on the newly cited prior art above and previously cited prior art; therein, claims 1, 18, 22, 23, and 40 include allowable subject matter and considered pertinent to the applicant's disclosure, taken individually or in combination, the prior art of record and the newly cited prior art above does not teach or suggest the claimed limitations having " a method for distributed lock management comprising: determining, by a requesting node requesting a lock, a current lock owner of the lock in accordance with an indicator specifying which one or more nodes are available as lock owners; and sending a lock request message to said current lock owner; and wherein ... said determining is performed by said requesting node prior to said sending for each request, and wherein, each time said lock is granted, an expiration time is determined indicating that said lock expires automatically when said expiration time is reached. The remaining claims 2-17, 19-21, 24-39, and 41-43 are allowed by virtue of their dependencies on the independent claims.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should

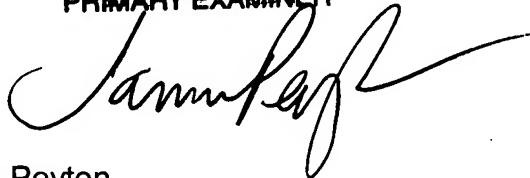
Art Unit: 2182

preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tammara Peyton whose telephone number is (571) 272-4157. The examiner can normally be reached between 6:30 - 4:00 from Monday to Thursday, (I am off every first Friday), and 6:30-3:00 every second Friday. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kim Huynh can be reached on (571) 272-4083. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300. Any inquiry of a general nature of relating to the status of this application should be directed to the Group receptionist whose telephone number is (571) 272-2100.

**TAMMARA PEYTON
PRIMARY EXAMINER**

A handwritten signature in black ink, appearing to read 'Tammara Peyton', written over the printed name and title.

Tammara Peyton

October 25, 2007